

HALL ET AL  
Serial No. 13/694,827  
Filed 10/29/2003  
Examiner: Strickland  
Group Art Unit 1754

REMARKS

The Office action of April 21, 2005 has been carefully considered and the application has been amended accordingly.

Claims 1-28 are present in the application. Claims 11, 21 and 27 have been amended to put them in independent form; these claims are deemed to be allowed in view of paragraphs 8 and 9 of the Office action. Claim 28 stands allowed in view of paragraphs 6 and 7 of the Office action.

Claims 1-5, 7, 8, 12-20, 22, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoard (US 5,746,984) in view of Kong et al. (US 5,427,747). Claims 6, 9, 10, 23 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoard in view of Kong as applied to (independent claims) 1 and 16 respectively above, and further in view of Yonemura et al. (US 5,194,078).

The rejections are believed to be improper and are respectfully traversed. It is submitted that the reasons set forth in the response of July 2, 2004 still apply and have not been overcome by the Office action of April 21, 2005.

In addition, applicants submit the following explanations of their invention. The present invention involves activating a gaseous hydrocarbon so that it is partially oxidized. This is achieved by passing it through a plasma reactor in the presence of a material that has oxidative properties in a plasma. The activated and partially oxidized hydrocarbon is then passed over a catalyst for reducing nitrogen oxides to nitrogen. Thus, the present invention removes nitrogenous oxides from a gaseous medium and converts them to nitrogen.

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Hoard discloses the use of a plasma reactor to "destroy" emissions present in the exhaust stream from a combustion process. Hoard goes on to teach that it is undesirable to operate a non-thermal plasma reactor under oxidizing conditions as this results in the production of undesirable nitrogen oxide products (column 2, lines 53-64). Hoard also discloses that the gases may be passed over a catalyst downstream of the plasma reactor. Hoard repeatedly mentions that emissions, including nitrogen oxides, are "destroyed" and does not indicate what is formed as a result. Further, Hoard discloses that where a catalyst is used this may be used to carry out "chemical treatments" (column 6, line 26). Therefore, Hoard does not disclose the use of a catalyst for the reduction of nitrogenous oxides per se. Thus, there is no disclosure in Hoard of the use of a material with oxidative properties in the plasma nor of a catalyst for reducing nitrogenous oxides to nitrogen.

The examiner is suggesting that Kong teaches the production of activated and oxidized hydrocarbons using a plasma reactor. This is not the case. Kong discloses using a plasma to produce hydrocarbon radicals (column 4, line 57). In contrast applicants produce partially oxidized activated hydrocarbons during the activation of the hydrocarbons. In Kong the hydrocarbon radicals only become oxidized once they are reacted with an oxygen containing species in the electrochemical cell. There is no disclosure in Kong that the dielectric barrier of the plasma reactor has oxidative properties. Therefore, Kong does not lead one skilled in the art to incorporate a material with oxidative properties into the plasma reactor of Hoard. Kong could only lead one skilled in the art to combine the plasma reactor with an electrochemical cell and this does not lead to the present invention.

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It is worth noting that Kong shows, in column 5, the reactions that occur in the plasma reactor and the electrochemical cell. Column 5 shows clearly that the methane gas is activated but not oxidized in the plasma reactor.

Form PTO-2038 is submitted herewith for payment of the three additional independent claims. The Commissioner is hereby authorized to charge any additional required fees associated with this communication and during the pendency of the application under 37 CFR 1.16 and 37 CFR 1.17 or to credit any overpayment to Deposit Account No. 082670.

In view of the foregoing amendments and remarks, applicants submit that the application is in condition for allowance of claims 1-28 and such action by the Examiner is courteously solicited.

Respectfully submitted,

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Date



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I hereby certify that this correspondence is being transmitted by facsimile this day to Examiner Strickland at the United States Patent and Trademark Office, Art Unit 1754, to fax No. 571-273-8300.

